

Controls on iceberg distribution around Greenland

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Purpose: Understand the changes in distribution of Greenland icebergs

Study Objective: Segment glacier termini, icebergs in mélangé, and icebergs in open waters of Greenland fjords

Imagery: PlanetScope

Findings: PlanetScope imagery over mélangé was found to have poor radiometric contrast. The images appeared washed out, making it impossible to differentiate between sea ice and mélangé in some cases. The researchers developed workflows and image processing tools necessary for identifying icebergs in open water, where the background color has a radiometrically sharp contrast with icebergs. Successful detection of smaller icebergs has significant implications for estimating the freshwater budget of the fjords and for studying ice sheet-ocean interactions.

Example of poor radiometric correction near the terminus of a glacier in east Greenland. Although the dark ice of the terminus can be detected, the icebergs inside the mélangé are not identifiable.



Frequency (purple bars) and total area (green line) of various iceberg sizes detected using Planet imagery on June 15, 2019. Green circles show the total area of all icebergs in a given histogram bin. Numerous small icebergs with a surface area of $< 100 \text{ m}^2$ are detected, which is at least 6 times greater than the rest of the icebergs (purple bars in Figure 3). These icebergs are smaller than single individual pixels of Sentinel-2 data (10 m resolution), and would not be detectable with Landsat data (30 m resolution for VNIR bands). The total area of all these small icebergs is nearly half the sum of icebergs that are larger than $10,000 \text{ m}^2$.

